

Patent Claims

1. A device for realizing an online element analysis for a substance (S) that is conveyed past or flows past a measuring station, said device comprising:
 - a conveying device (51) for the substance to be measured;
 - a measuring station with an X-ray source (10) and an X-ray fluorescence detector (20) having a radiation inlet, characterized in that at least one first X-ray conductor extends from the radiation inlet of the X-ray fluorescence detector (20) in the direction of the conveying device (51).
2. The device according to claim 1 or 2, characterized in that at least a second X-ray conductor extends from the X-ray source (10) in the direction of the conveying device.
3. The device according to claim 1 or 2, characterized in that the first and/or the second X-ray conductor each consist of at least one hollow tube.
4. The device according to claim 3, characterized in that the hollow tube in part is made of glass.

5. The device according to claim 4, characterized in that the hollow tube is a glass capillary (30, 40).
6. The device according to one of the claims 3 to 5, characterized in that at least some of the hollow tubes are provided with a window (30b) at the end facing the conveying device.
7. The device according to one of the claims 3 to 6, characterized in that at least some of the hollow tubes are filled with hydrogen or helium.
8. The device according to one of the claims 3 to 7, characterized in that at least some of the hollow tubes are connected to a helium source (28) and are flushed with helium during the operation.
9. The device according to claim 2 or one of the claims 3 to 8, provided these refer back to claim 2, characterized in that the first and the second X-ray conductors are combined in such a way that a bundle of at least two X-ray conductors is formed at the X-ray conductor ends facing the conveying device.
10. The device according to claim 7, characterized in that several first and several second X-ray conductors exist and these are combined so as to create a matrix-type structure.

11. The device according to claim 8, characterized in that the axes of the X-ray conductors are parallel to each other at the end facing the conveying device.
12. The device according to claim 7, characterized in that at least one second X-ray conductor and several first X-ray conductors are provided, which are arranged around the second X-ray conductor, at least at the end facing the conveying device (51).
13. The device according to claim 7 or claim 10, characterized in that the axes of at least one second X-ray conductor and at least one first X-ray conductor jointly enclose an acute angle in the direction of the conveying device.
14. The device according to one of the preceding claims, characterized in that at least one thermal shield (59) is disposed between the X-ray fluorescence detector (20) and the conveying device (51).
15. The device according to one of the preceding claims, characterized in that it is provided with a distance sensor for measuring the height of the sample surface.
16. The device according to claim 15, characterized in that the distance sensor is a laser distance sensor (60).

17. The device according to claim 16, characterized in that a waveguide (61) is connected to the laser distance sensor (60) to permit a remote distance measuring.
18. The device according to claim 17, characterized in that the waveguide (61) forms a bundle together with the at least one first X-ray conductor.
19. The device according to one of the preceding claims, characterized in that an X-ray split lens (12) for the parallel alignment of the X-rays is disposed in the beam path from the X-ray source (10).
20. The device according to one of the preceding claims, characterized in that a filter (42) or a monochromatic element is arranged in the beam path from the X-ray source.
21. The device according to one of the preceding claims, characterized in that a polarizer (44) is arranged in the beam path from the X-ray source.
22. The device according to one of the preceding claims, characterized in that the first X-ray conductor and the exciting radiation from the X-ray source essentially have the same angle relative to the sample surface.
23. The device according to claim 23, characterized in that the angle is a flat angle.

24. The device according to claim 21 and claim 23, characterized in that the flat angle corresponds to the Brewster angle for the polarized radiation.
25. The device according to claim 6 and claim 21, characterized in that the filter functions as a window.
26. The device according to one of the preceding claims, characterized in that the measuring station is arranged on a traversing and/or pivoting carriage.